

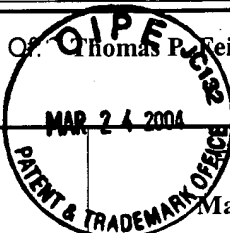
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AP/1773

TRANSMITTAL OF APPEAL BRIEF (Large Entity)

Docket No.
08CN8803-21

In Re Application Of: Thomas P. Reist, et al.



Serial No.
09/845,743

Filing Date
May 1, 2001

Examiner
K. Bernatz

Group Art Unit
1773

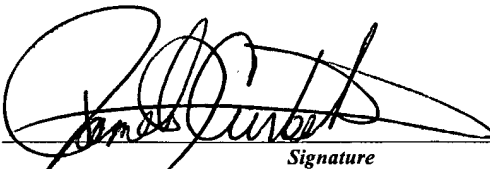
Invention: DATA STORAGE MEDIA

TO THE COMMISSIONER FOR PATENTS:

Transmitted herewith in triplicate is the Appeal Brief in this application, with respect to the Notice of Appeal filed on January 15, 2004

The fee for filing this Appeal Brief is: \$330.00

- ☐ A check in the amount of the fee is enclosed.
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8CN8803-25

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Thomas P. Feist, et al.)
) Group Art Unit: 1773
Serial No.: 09/845,743)
)
Filed: May 1, 2001) Examiner: K. Bernatz
)
For: DATA STORAGE MEDIA)

Mail Stop: Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313

APPEAL BRIEF

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I. REAL PARTY IN INTEREST

The real party in interest in this appeal is General Electric Company.

II. RELATED APPEALS AND INTERFERENCES

There is one other appeal known to Appellant that may directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal; namely the appeal of U.S. Patent Application No. 09/683,114 to Davis et al. There are no interferences known to Appellant, Appellant's legal representatives, or assignee which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

III. STATUS OF THE CLAIMS

Claims 1 – 75 are pending in the application. All of the pending claims stand rejected. The rejection of Claims 1 – 75 is appealed. Claims 1 – 75, as they currently stand, are set forth in Appendix A.

IV. STATUS OF AMENDMENTS

Claims 21, 26, 30, 36, and 67 were amended and Claims 73 – 75 were added in an amendment submitted June 10, 2003. The amendment and new claims were entered.

V. SUMMARY OF THE INVENTION

This application relates to data storage media. Optical, magnetic, and magneto-optic media are primary sources of high performance storage technology that enables high storage capacity coupled with a reasonable price per megabyte of storage. Improved areal density has been one of the key factors in the price reduction per megabyte, and further increases in areal density continue to be demanded by the industry. (Paragraph [0004])

Polymeric data storage media have only been employed in areas such as compact disks (CD), and similar relatively low areal density devices, e.g., less than about 1 Gbit/in², which are read-through devices requiring the employment of a good optical quality substrate having low birefringence. (Paragraph [0006])

Storage media of higher areal densities, e.g., greater than 5 Gbits/in², employ first surface or near field read/write techniques in order to increase the areal density. For such storage media, although the optical quality of the substrate is not relevant, the physical and mechanical properties of the substrate become increasingly important. For high areal density applications, including first surface applications, the surface quality of the storage media can affect the accuracy of the reading device, the ability to store data, and replication qualities of the substrate. Furthermore, the physical characteristics of the storage media when in use can also affect the ability to store and retrieve data; i.e., the axial displacement of the media, if too great, can inhibit accurate retrieval of data and/or damage the read/write device. (Paragraph [0008])

Conventionally, storage media associated with employing first surface, including near field, techniques have been addressed by utilizing metal, e.g., aluminum, and glass substrates. These substrates are formed into a disk and the desired layers are disposed upon the substrate using various techniques, such as sputtering. (Paragraph [0009]) As is evident from the fast pace of the industry, the demand for greater storage capacities at lower prices, the desire to have re-writable disks, and the numerous techniques being investigated, further advances in the technology are constantly desired and sought. (Paragraph [0010])

It should be understood that this area of technology is crowded, very active, and very inventive. As is well known, in the early 1980s, most people worked on terminals connected to very large mainframe computers that stored all of the data. These mainframe computers ("main frames") were the size of small rooms. By the end of the 1980s, many people, particularly college students and businesses, owned and worked on personal computers where data was stored locally, in computers the size of boxes that readily fit beneath a desk, and/or on floppy disks (i.e., a media that required a solid plastic housing due to its highly flexible nature). These floppy disks were capable of storing a maximum of less than 1 megabyte (MB) of data. The next

advance in the technology was the advent of the smaller floppy disk that stored more data (i.e., 1.44 MB of data). Although there is always a desire to store more data in a smaller space, the design and properties of the smaller floppy disk was not obvious in view of the original floppy disk.

More storage and speed was needed from the floppy disks, but was not attainable so the industry turned to hard disks. These hard disks stored more data but were very large (e.g., up to half a meter in diameter) and not readily available to the general public. Around the early 1990s the hard disks became more available to the general public as the price and size decreased. Throughout the 1990s, industry continued to drive toward smaller, faster, cheaper, higher capacity hard disks. Hard disk drives became common in home computers as well as in personal computers used in businesses. Eventually the limiting factor for these hard disks, however, became the physical capability of putting additional data thereon. New recording head and magnetic thin film technology has resulted in continual increases in data density, but the rate of increase in amount of data storage has slowed. That is, the newer disks were reaching technological limits of data density (bits per square inch), and in fact are approaching the “super-parametric limit” where additional data could not be disposed onto the disk without the potential for spontaneous loss of data due to demagnetization. The technology had to take another turn in order to advance further.

Appellants have discovered a way to increase the capacity of data storage media beyond that previously available. To address the industry needs, Appellants have developed a data storage media that is particularly useful in first surface applications. This media can attain an areal density of greater than about 20 Gbits/in², with areal densities even up to and exceeding about 100 Gbits/in² anticipated. (Paragraph [0031]) The claimed storage medias comprise: (i) a substrate having a plastic resin portion, an edge lift height of less than about 8 μ , a surface roughness of less than about 10Å, and an axial displacement peak of less than about 500 μ under shock or vibration excitation (Claims 1 – 29, and 73); (ii) a substrate having a plastic portion and an axial displacement peak of less than about 500 μ under shock or vibration excitation, an areal density of about 10 Gbit/in², and a surface roughness of less than about 10Å (Claims 30 – 55, and

74); or (iii) a substrate having a plastic resin portion and a core, wherein said core further comprises a varied thickness (Claims 56 – 72 and 75).

VI. ISSUES

1. WHETHER CLAIMS 1 – 27, 30 – 53, 56 – 70, AND 73 – 75 ARE OBVIOUS IN VIEW OF U.S. PATENT NO. 5,538,774 TO LANDIN ET AL. AS EVIDENCED BY U.S. PATENT NO. 5,972,461 TO SANDSTROM, QUANTEGY PROFESSIONAL MEDIA, [HTTP://WWW.PNCENGINEERING.COM/MODSPEC](http://www.pncengineering.com/modspec) (HEREINAFTER “QUANTEGY”), U.S. PATENT NO. 5,981,015 TO ZOU ET AL., U.S. PATENT NO. 6,030,681 TO CZUBAROW ET AL., U.S. PATENT NO. 5,948,495 TO STANISH ET AL., U.S. PATENT NO. 6,127,017 TO HIRATA ET AL., U.S. PATENT NO. 6,194,045 B1 TO ANNAcone ET AL., U.S. PATENT NO. 5,866,489 TO YAMAGUCHI, U.S. PATENT NO. 6,236,542 B1 TO HARTOG ET AL., U.S. PATENT NO. 5,741,403 TO TENHOVER ET AL., U.S. PATENT NO. 4,987,020 TO BONNEBAT ET AL., U.S. PATENT APPLICATION NO. 2001/0022705 A1 TO MORI ET AL., U.S. PATENT NO. 5,585,159 TO MIYAKE ET AL., U.S. PATENT NO. 5,585,989 TO KUROMIYA ET AL. AND U.S. PATENT NO. 5,875,083 TO ONIKI ET AL.?

2. WHETHER CLAIMS 28, 29, 54, 55, 71, AND 72 ARE OBVIOUS OVER LANDIN ET AL. IN VIEW OF U.S. PATENT NO. 6,156,422 TO WU ET AL.?

3. WHETHER CLAIMS 1 – 14, 17, 18, 20, 21, 24 – 26, 30 – 39, 42, 43, 45, 46, AND 49 – 53 ARE OBVIOUS IN VIEW OF JP-02-096921 A TO KIYOTAKA ET AL. (abstract only) AS EVIDENCED BY SANDSTROM, QUANTGEY, ZOU ET AL., CZUBAROW ET AL., STANISH ET AL., HIRATA ET AL., ANNAcone ET AL., YAMAGUCHI, HARTOG ET AL., TENHOVER ET AL., BONNEBAT ET AL., MORI ET AL., MIYAKE ET AL., KUROMIYA ET AL., AND ONIKI ET AL.?

4. WHETHER CLAIMS 1 – 14, 17, 18, 20, 21, 24 – 39, 42, 43, 45, 46, AND 49 – 55 ARE OBVIOUS IN VIEW OF U.S. PATENT NO. 6,433,964 B1 TO CHANG AS EVIDENCED BY SANDSTROM, QUANTGEY, ZOU ET AL., CZUBAROW ET AL., STANISH ET AL., HIRATA ET AL., ANNAcone ET AL., YAMAGUCHI, HARTOG ET AL., TENHOVER ET AL., BONNEBAT ET AL., MORI ET AL., MIYAKE ET AL., KUROMIYA ET AL., AND ONIKI ET AL.?

5. WHETHER CLAIMS 1 – 27, 30 – 53, 56, AND 58 – 68 ARE OBVIOUS IN VIEW OF OTADA ET AL. AS EVIDENCED BY SANDSTROM, QUANTGEY, ZOU ET AL., CZUBAROW ET AL., STANISH ET AL., HIRATA ET AL., ANNAcone ET

AL., YAMAGUCHI, HARTOG ET AL., TENHOVER ET AL., BONNEBAT ET AL., MORI ET AL., MIYAKE ET AL., KUROMIYA ET AL., ONIKI ET AL., U.S. PATENT NO. 5,119,259 TO KIKUCHI, U.S. PATENT NO. 4,742,420 TO OISHI, U.S. PATENT NO. 5,552,009 TO ZAGAR ET AL., U.S. PATENT NO. 5,292,550 TO FUJII ET AL., AND U.S. PATENT NO. 6,165,391 TO VEDAMUTTU?

6. WHETHER CLAIMS 15, 16, 19, 22, 23, 27, 40, 41, 44, 47, 48, AND 56 – 70 ARE OBVIOUS OVER KİYOTAKA ET AL., AND FURTHER IN VIEW OF LANDIN ET AL.?

7. WHETHER CLAIMS 15, 16, 19, 22, 23, 40, 41, 44, 47, 48, AND 56 – 72 ARE OBVIOUS OVER CHANG IN VIEW OF LANDIN ET AL.?

8. WHETHER CLAIMS 69 AND 70 ARE OBVIOUS OVER OTADA ET AL. IN VIEW OF LANDIN ET AL.?

9. WHETHER CLAIMS 28, 29, 54, 55, 71, AND 72 ARE OBVIOUS OVER KİYOTAKA ET AL. OR JP 63-205817A TO OTADA ET AL. (abstract only), AND FURTHER IN VIEW OF WU ET AL.?

10. WHETHER CLAIMS 73 AND 74 ARE OBVIOUS OVER CHANG OR OTADA ET AL. IN VIEW OF U.S. PATENT NO. 4,911,967 TO LAZZARI?

11. WHETHER CLAIM 75 IS OBVIOUS OVER CHANG IN VIEW OF LANDIN ET AL., AND FURTHER IN VIEW OF LAZZARI?

VII. GROUPING OF CLAIMS

The claims do not stand together. The claims are directed to various novel characteristics, properties, and/or designs of data storage media. These characteristics, properties, and designs are not obvious in view of other claimed characteristics, properties, and designs. For example, radial tilt (e.g., Claims 8 and 38) is not obvious in view of a core design (e.g., Claim 14 – 25, 39 – 50, and 57 – 66). Additionally the modal frequencies (e.g., Claims 12 and 13) are not obvious in view of the radial tilt, core designs, roughness, moments of inertia, or other claimed characteristics, properties, and designs. The moisture content (e.g., Claims 9 and 37) is not obvious in view of the modal frequencies, tilt characteristics, core designs, mechanical

dampening coefficient, edge lift, and the like. The novel characteristics, properties, and designs of the data storage media are not obvious in view of other claimed characteristics, properties, and/or designs, and all add patentable distinction.

VIII. ARGUMENT

A. SUMMARY OF THE ART

Appellants would first like to recognize and point out that the data storage media art is a very crowded area of art. As is clearly evident in many homes within the United States, technology surrounding data storage has changed drastically in the past 30 years. Whereas 30 years ago many Americans were not familiar with a computer, how it works, or its potential uses, computers are prevalent in American homes today. Main frames are no longer prominent, personal computers have replaced these “archaic” devices. Even preschoolers use computers for learning and play games. The video industry has similarly changed drastically from the old reel film (on which many people still have “old movies”, to video cassettes, and more recently to DVDs). Cassette tapes are being replaced with compact discs. Basically, the data storage industry is screaming forward at an incredible rate.

There is a constant desire and need to improve the storage media; e.g., to find new ways to store greater amounts of data in even smaller areas. However, a mere need or desire, or a generic claim of a “better media”, a “flat” surface, a “low” roughness, etc., is not a teaching with respect to specifics of any of those properties, etc. These are relative terms that must be understood in the context of the case in which they are discussed. In other words, an artisan would read those claims in relation to the technology at the time of the reference (what they could have possibly meant by their teaching), and not in hindsight provided by Appellants application.

As can be noted from the “Issues” section hereof, many of the references are employed in various combinations and/or in view of “evidence” allegedly provided by other references to

allegedly render the present application unpatentable. In order to simplify the rejections, clarify the teachings of the references, and to clearly and concisely respond to the rejections, descriptions of all of the references are set for below.

Landin et al. is directed to a method for internally damping a rotatable storage article, which is subject to resonant vibration. (Abstract) Landin et al. fail to teach a substrate comprising a plastic portion and an edge lift height of less than about $8\text{ }\mu$, a surface roughness of less than about 10\AA , and an axial displacement peak of less than about $500\text{ }\mu$ under shock or vibration excitation.

Kiyotaka et al. are directed to a magnetic recording medium having a plastic substrate. Disposed on the substrate are various layers e.g., ceramic layers, buffer layer, non-metallic films, a magnetic layer, a protective lubricating layer. (Abstract) Kiyotaka et al. fail to teach a substrate comprising a plastic portion and an edge lift height of less than about $8\text{ }\mu$, a surface roughness of less than about 10\AA , and an axial displacement peak of less than about $500\text{ }\mu$ under shock or vibration excitation.

Wu et al. teach a high density magnetic recording medium with high HR and low MRT by employing particular layers with particular parameters. Wu et al. do not address tilt or solve the deficiencies of the other references of record. Wu et al. fail to teach a substrate comprising a plastic portion and an edge lift height of less than about $8\text{ }\mu$, a surface roughness of less than about 10\AA , and an axial displacement peak of less than about $500\text{ }\mu$ under shock or vibration excitation.

Chang is directed to a method of making a high density recording medium having a non-magnetic metallic layer on a *flexible substrate*, wherein the high density recording medium can be used as *floppy disk* with greater data storage capacity (Abstract). Chang fails to teach a substrate comprising a plastic portion and an edge lift height of less than about $8\text{ }\mu$, a surface roughness of less than about 10\AA , and an axial displacement peak of less than about $500\text{ }\mu$ under shock or vibration excitation.

Lazzari is directed to a substrate for magnetic disk memory comprising an aluminum

wafer with two plastic sheets pressed thereto. (Abstract) Lazzari fails to teach a substrate comprising a plastic portion and an edge lift height of less than about $8\text{ }\mu$, a surface roughness of less than about 10Å , and an axial displacement peak of less than about $500\text{ }\mu$ under shock or vibration excitation.

Otada et al. disclose that to improve surface smoothness so that the deformation is prevented at the time of forming an underlying and magnetic layer and to permit reduction in weight and improvement in productivity by coating the surface of a ceramic substrate with a heat resistant plastic layer (Abstract). Otada et al. fail to teach a substrate comprising a plastic portion and an edge lift height of less than about $8\text{ }\mu$, a surface roughness of less than about 10Å , and an axial displacement peak of less than about $500\text{ }\mu$ under shock or vibration excitation.

Sandstrom, Quantgey, Zou et al., Czubarow et al., and Stanish et al., are all relied upon as alleged evidence support the Examiner's contention that "it would have been obvious to one having ordinary skill in the art to have minimized the cause effective variables such as 'edge lift height' and 'axial displacement peak' to values meeting Appellants claimed limitations through routine experimentation, especially given the knowledge in the art that low values of edge lift and axial displacement peak are desired for increased areal recording density...". (Final Rejection dated November 19, 2003, hereinafter "FR"; pages 6, 12 – 13, 18, 24)

Hirata et al., Annacone et al., Yamaguchi, Hartog et al., Tenhover et al., and Bonnebat et al., are all relied upon as alleged evidence that "it would have been obvious to one having ordinary skill in the art to have minimized the cause effective variable 'surface roughness' to values meeting Appellants' claimed limitations through routine experimentation, especially given the knowledge that extremely low (i.e., $< 10\text{ Å}$) surface roughness values are required for near-field high density recording media...". (FR, pages 6, 13, and 18 – 19)

Hartog et al., Tenhover et al., and Annacone et al. are relied upon to as alleged evidence that "areal recording density is a function of the track width, track density, and spatial location of the head relative to the medium, and is not a property solely of the media, per se, and therefore has been given little weight... [since] '[i]n apparatus, article, and composition claims, intended use must result in a *structural difference* between the claimed invention and the prior art... *If*

the prior art structure is capable of performing the intended use, then it meets the claim....”

(FR, pages 6 – 7; *emphasis* in original; page 13, 19, 25)

B. DECLARATION OF DR. THOMAS FEIST

After several unsuccessful attempts to explain the storage media art, the development thereof, the problems associated therewith, and the view of someone with at least ordinary skill in the area of storage media, Appellants obtained and submitted a Declaration from Dr. Thomas Feist (Attached hereto as Appendix B). Dr. Feist explained the history of storage media so that the novelties of the current invention as well as the limitations of the teachings of the prior art would be clear.

8. ...As is well known, in the early 1980s, most people worked on terminals connected to very large mainframe computers that stored all of the data. These mainframe computers (“main frames”) were the size of small rooms. By the end of the 1980s, many people, particularly college students and businesses, owned and worked on personal computers where data was stored locally, in computers the size of boxes that readily fit beneath a desk, and/or on floppy disks (i.e., a media that required a solid plastic housing due to its highly flexible nature). These floppy disks were capable of storing a maximum of less than 1 megabyte (MB) of data. The next advance in the technology was the advent of the smaller floppy disk that stored more data (i.e., 1.44 MB of data). Although there is always a desire to store more data in a smaller space, the design and properties of the smaller floppy disk was not obvious in view of the original floppy disk.

More storage and speed was needed from the floppy disks, but was not attainable so the industry turned to hard disks. These disks stored more data but were very large (e.g., up to half a meter in diameter) and not readily available to the general public. Around the early 1990s the hard disks became more available to the general public as the price and size decreased. Throughout the 1990s, industry continued to drive toward smaller, faster, cheaper, higher capacity hard disks. Hard disk drives became common in home computers as well as in personal computers used in businesses. Eventually the limiting factor for these hard disks, however, became the physical capability of putting additional data thereon. New recording head and magnetic thin film technology has resulted in continual increases in data density, but the rate of increase has slowed. That is, the newer disks were reaching technological limits of data density (bits per square inch), and in fact are approaching the “super-parametric limit” where additional data could

not be disposed onto the disk without the potential for spontaneous loss of data due to demagnetization. The technology had to take another turn or it would not advance.

9. The present Patent Application teaches and claims the next advance in the technology where the substrate for the storage media comprises at least one plastic portion, an edge lift height of less than about $8\text{ }\mu$, a surface roughness of less than about 10\AA , and an axial displacement peak of less than about $500\text{ }\mu$ under shock or vibration excitation. The present application additionally teaches the effects and desired modal frequencies, tilt, surface features, moment of inertia, and other factors that enable additional data storage that was not previously available for storage media as claimed in the present application.

10. Applicants have discovered a way to increase the capacity of data storage media beyond that previously available. Applicants note that their application claims the benefit of filing dates in 1999. The technology has further advanced since 1999, e.g., individuals can purchase hard disks with up to about 200 Gigabytes (GB) of data storage for a few hundred dollars whereas in 1999 such media was not even available. These technological advances illustrated by the marketplace, however, do not render the present invention obvious. Actually, they support the position that advances were non-obvious and greatly desired. There has been great commercial success in this area, and the market for higher capacity media is growing exponentially.

11. The limitations taught and claimed in the Present Application were not obvious to artisans at the time of the Present Application. Granted, a desire to improve capacity existed[] and continues to exist. Avenues and processes that enable such improvement did not exist. In fact, there were several articles written about the need to find a new way to achieve higher density media and “beat” the superparamagnetic limit. Researchers have postulated various means of achieving this, such as Heat Assisted Magnetic Recording, but none have been able to demonstrate a way to achieve it. In other words, an unfulfilled need existed in the industry that is met by the present invention. A mere desire to have an improved product does not render the improvement obvious. If all of these improvements were so obvious, the market for this technology would not be dominated by a handful of high technology companies; it would be flooded by individuals looking to jump on the bandwagon. This field is not an area where all technological advances have already been made. It is an area where highly skilled and educated people are racing to reduce costs, decrease media size, and increase data retrieval speeds in order to give their company a competitive advantage in the marketplace.

C. REMARKS

1. Analysis of the Art With Respect to the Present Invention

a. CLAIMS 1 – 27, 30 – 53, 56 – 70, AND 73 – 75 ARE NOVEL AND NON-OBVIOUS IN VIEW OF LANDIN ET AL.

As stated above, Landin et al. is directed to a method for internally damping a rotatable storage article, which is subject to resonant vibration. Landin et al. introduce a viscoelastic material as an inner layer(s) of a rotatable storage article. (Abstract) Landin et al. fail to teach a substrate comprising a plastic portion and an edge lift height of less than about 8 μ , a surface roughness of less than about 10 Å, and an axial displacement peak of less than about 500 μ under shock or vibration excitation.

As correctly stated in the Final Rejection, this reference fails to disclose a surface roughness of less than about 10 Å as claimed by Appellants' in independent Claims 1 and 30. However, the Examiner contends that:

it would have been obvious to one having ordinary skill in the art to have minimized the cause effective variable "surface roughness" to values meeting applicants' claimed limitations through routine experimentation, especially given the knowledge that extremely low (i.e. <10 Å) surface roughness values are required for near-field high density recording media as evidenced by Hirata et al. ('017), Annacone et al. ('045), Yamaguchi ('489), Hartog et al. ('542 B1), Tenhover et al. ('403) and Bonnebat et al. ('020).

(FR, page 6; emphasis in original) It is also noted in the Final Rejection that,

...even in the instance that the claimed limitations of "an edge-lift height" and "an axial displacement peak" would not have necessarily been present in every embodiment taught by Landin et al., it would have been obvious to one having ordinary skill in the art to have minimized the cause effective variables such as the "edge lift height" and "axial displacement peak" to values meeting applicants' claimed limitations through routine experimentation, especially given the knowledge in the art that low values of the edge lift and axial displacement peak are desired for increased recording density as evidenced by Sandstrom ('461), Quantegy article, Zou et al. ('015), Czubarow ('681) and Stanish et al. ('495)....

(FR, page 6; emphasis in original)

As is clearly set for in Dr. Feist's Declaration,

With respect to Landin et al.,... the Examiner seems to recognize that the claimed limitations in the Present Application are not inherent, i.e., are not necessarily present: "in the instance that the claimed property limitations would not necessarily have been present... it would have been obvious to one having ordinary skill in the art to have minimized the cause effective variables...". It is correct that the claimed elements of the Present Application are not necessarily present in these references. The limitations set forth in [Landin et al.] can readily be attained without meeting the limitations of the claims of the Present Application. In other words, thru testing, experiments, and/or modeling performed during the development of the claimed media, disks having the parameters described in these references were reviewed for their properties. *These disks failed to meet the claimed limitations.*

In hindsight (i.e., with the teaching and knowledge imparted by the Present Application), Landin et al., can be altered to meet the teachings of the Present Application. However, there is no teaching or motivation in th[is] reference[] to any such modification and the claimed limitations do not necessarily flow from the reference['s] teachings. There is no enablement in [this reference] on how to meet the claim limitations or mention of their existence or importance. At a minimum, [this reference does not] even mention: edge lift, moment of inertia, tilt (radial or tangential), moisture content, specific gravity, or modal frequency. These are variables identified and claimed in the Present Application. They are non-obvious and not mere optimizations.

Many characteristics, and in particular the combination of characteristics, set forth in the Patent Application are not identified or addressed in [] Landin et al.... The Patent Application identifies a unique product that meets certain characteristics, thereby allowing it to attain high capacity while being mass producible.

(Dr. Feist's Declaration, Paragraphs 13 – 15; *emphasis added*)

In order to rebut Dr. Feist's Declaration, the Examiner repeatedly refers to Sandstrom, Quantegy, Zou et al., Czubarow et al., Stanish et al., Hirata et al., Annacone et al., Yamaguchi, Hartog et al., Tenhover et al., and Bonnebat et al., as alleged *evidence* that the claimed properties of edge-lift height, axial displacement peak, and surface roughness are mere cause effective

variables that may be optimized through mere routine experimentation. (FR, Page 6, 13, 18 – 19, and 24 – 25) In other words, these references have not been cited against Appellants as “prior art”, i.e., are not “combined” with the main reference, but are merely “referred to” as alleged proof of how one of ordinary skill in the art would view Landin et al. or various other references.

As is clear from the statute, obviousness is determined at the time of the present invention, not with the knowledge of the present invention. However, it appears that the Examiner has used an improper standard in arriving at the rejection of the above claims under section 103, based on improper hindsight which fails to consider the totality of Appellants’ invention and the totality of the cited references. More specifically the Examiner has used Appellants’ disclosure to select portions of the cited references to allegedly arrive at Appellants’ invention. In doing so, the Examiner has failed to consider the teachings of the references or Appellants’ invention as a whole in contravention of section 103.

Section 103 sets out the test for obviousness determinations. It states, in pertinent part, that such determinations are to be made by consideration of

...the differences between subject matter sought to be patented and the prior art such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the [pertinent] art.

In making a Section 103 rejection, the *Examiner* bears the burden of establishing a prima facie case of obviousness. In re Fine, 5 U.S.P.Q. 2d 1596, 1598 (Fed. Cir. 1998). The Examiner

...can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in art would lead that individual to combine the relevant teachings of the references.

Id.

In the instant case, the Examiner has identified areas where the prior art fails to teach the present claims, merely titled those failures as either “cause effective variables” or “necessarily present”, and thereby assumed that the present application is obvious. Dr. Feist purports to explain how the elements of the present claims are neither necessarily present

thru testing, experiments, and/or modeling performed during the development of the claimed media, disks having the parameters described in these references were reviewed for their properties. ***These disks failed to meet the claimed limitations.***

(Dr. Feist's Declaration, Paragraph 13; *emphasis added*) and are not cause effective variables that may be optimized through mere routine experimentation

[T]here is no teaching or motivation in th[is] reference[] to any such modification and the claimed limitations do not necessarily flow from the reference[']s teachings. There is no enablement in [this reference] on how to meet the claim limitations or mention of their existence or importance. At a minimum, [this reference does not] even mention: edge lift, moment of inertia, tilt (radial or tangential), moisture content, specific gravity, or modal frequency. These are variables identified and claimed in the Present Application. ***They are non-obvious and not mere optimizations.***

(Dr. Feist's Declaration, Paragraph 14; *emphasis added*)

With respect to Sandstrom, Quantegy, Zou et al., Czubarow et al., Stanish et al., Hirata et al., Annacone et al., Yamaguchi, Hartog et al., Tenhover et al., and Bonnebat et al., if anything, these references support the contention that the properties of the storage media claimed are not mere cause effective variables that can be optimized through "routine" experimentation. These references address issues such as warp and roughness in various fashions to attempt to produce novel disks. They in no way teach or suggest that any of these variables are cause effective or are readily optimizable. To the contrary, they discuss several problems in the prior art and attempt various was of addressing the problems. Sandstrom discusses flatness but fails to teach or suggest edge-lift height or axial displacement, and teaches a thick disk (i.e., thickness ≥ 1.5 mm) in order to attain the desired properties; (Quantegy is not a valid prior art reference since it has no date and there is no evidence that is was known or published before the present invention); Zou et al. address deflection and warp in disk substrates with thinner and thinner dimensions by particular material choice (Col. 1, lines 29 – 50); Czubarow et al. disclose a disk with a cermet layer on a porcelain substrate having multiple crystalline phases (Abstract); Stanish et al. disclose particular ceramic-metal matrix compositions for magnetic disk substrates (Abstract); Hirata et al. disclose a cavity surface for injection molding information recording disks (Abstract); Annacone et al. disclose a substrate with a core and a smoothing layer (Col. 4, lines 24 - 26); Yamaguchi discloses a glass-ceramic substrate having a particular composition can be used for

magnetic disk (Abstract); Hartog et al. disclose a substrate superpolishing process where a disk is machined to a predetermined surface roughness; Tenhover et al., who address warpage of aluminum-based disks, disclose ceramic disks with a silicon carbide smoothing layer (Col. 1, line 65 – Col. 2, lines 10; Col. 3, lines 44 – 50); and Bonnebat et al. address buckling in injection-molded disk members. As is evident from all of these references, numerous factors affect substrate quality, use for different applications (optical, near-field, etc.), and, although new media are constantly being developed, and various attempts at improving the properties have been made, the improvements are not simple, obvious, or mere “cause effective variables”. Several factors can affect properties such as tilt, axial displacement, and others. A mere statement that “flatness” is desired is neither enabling or even a teaching. “Flatness” is a relative term. Depending upon the particular teaching, the article may be considered “flat”, but in no way attain the claimed limitations. A media can look flat yet, microscopic fluctuations therein can affect the media’s usefulness. Additionally, merely stating that flatness is desired in no way clarifies what is meant by flat or how to obtain such flatness. Appellants have taught and claimed a specific combination of criteria for the storage media that is neither taught nor suggested by the references.

By listing some of the novel features of the present invention that are not taught in the prior art and then arbitrarily characterizing those features as “cause effective variables” that require mere routine experimentation, the Examiner has not presented a *prima facie* case of obviousness. Merely the sheer volume of art in this field as well as the various avenues the art used to attempt to increase areal density, address flatness, etc., and the commercial success of greater density medias (particularly that are have a smaller size), is evidence of the non-obviousness of the claimed invention as well as the long felt need.

With respect to Claim 26, the Examiner has reminded Appellants that

“[t]he transitional phrase ‘consisting essentially of’ limits the scope of a claim to the specified materials or steps ‘and those that do not materially affect the basic and novel characteristic(s)’ of the claimed invention...[”]

In the instant case, the basic and novel characteristics of the claimed invention are a substrate possessing a combination of low edge lift, low axial displacement and small surface roughness.

(FR, pages 3 – 4, emphasis in original) However, Appellants note that different materials and steps do materially affect edge lift, axial displacement, and surface roughness, as discussed in the specification and Dr. Feist’s Declaration, and argued throughout the prosecution of this application. Different materials, methods..., produce different media. The unique media of the present Claim 26 has a substrate consisting essentially of plastic, wherein the substrate has an edge lift height of less than about 8 μ , a surface roughness of less than about 10Å, and an axial displacement peak of less than about 500 μ under shock or vibration excitation. None of the art of record teach such a media.

Regarding Claim 30, the Examiner claims that

areal density is a function of track width, track density, and spatial location of the head relative to the medium, and is not a property solely of the media, per se, and therefore[e] has been given little weight in determining patentability since it is an intended-use limitation...

(FR, pages 6 – 7) Head – media separation is not part of the *definition* of *areal density*. “*Areal density*, also sometimes called *bit density*, refers to the amount of data that can be stored in a given amount of hard disk platter “real estate”. Since disk platter surfaces are, of course, two-dimensional, areal density is a measure of the number of bits that can be stored in a unit of area (i.e., track per inch times bits per inch). As is taught throughout the present application, obtaining the desired areal density is a function of various properties and combinations of those properties; i.e., there is a ***structural difference*** that enables a greater areal density. For example, that is why a much greater storage density is obtained on a compact disk than a floppy disk. The

properties are different thereby enabling a different density. Appellants contend that the storage densities do add patentable subject matter.

Appellants do not disagree that, in order to read a disk having a particular areal density, one must have a device capable of reading such density. However, Appellants are not claiming the read/write device, Appellants are claiming a media that is capable of supporting a certain amount of data; i.e., having a particular areal density. For example, if you look at one of your floppy disks, it will have, printed on the encasing, “1.44 MB”; i.e., an areal density of 1.44 megabytes. The areal density refers to what the *media is capable of supporting*. Appellants are not herein claiming the read device (read head, wiring, integrated circuit...), and do not deny that an appropriate device is needed to read a media having a particular areal density. However, that does not change the fact that the media can have that areal density; i.e., be capable of supporting a particular amount of data in a given area.

With respect to the cores of Landin et al., the Examiner refers to Figure 4b to illustrate a core having a varied thickness “(Figure 4b, where the core varies from zero to non-zero across the width of the medium – elements 52 – 54)”. (FR, page 9, *emphasis in original*) Appellants respectfully disagree. In Figure 4b, Landin et al., show a core having a constant thickness and having hollow areas and areas comprising damping material. However, contrary to the Examiner’s contention, they fail to illustrate or mention a core having a varied thickness.

Regarding Claims 73 – 75, the Examiner contends that “Landin et al. disclose ‘pits and grooves’ in the plastic portion of the substrate (Figures 4 and 4b, elements 32, 33, 35, 52, 53 and 54.)” However, elements 33 and 52 refer to damping layers, while elements 32, 36, and 53 refer to damping material, and element 54 refers to a space between the damping material (e.g., a cavity). Neither discussed nor illustrated in Landin et al. are pits and/or grooves in the plastic portion of the substrate.

Finally, regarding many of the dependent claims, e.g., Claims 5-12, 35-38, and 51-53, and others, the Examiner merely contends that these claims are directed to property limitations of the claimed medium that are not explicitly disclosed by the Landin et al. or other of the various references (e.g., Chang, Otada et al., Kiyotaka et al., etc.). The Examiner contends that:

However, in the instant case, the claimed and prior art products are substantially identical in structure and composition (i.e., a composite substrate formed from both rigid materials and plastic materials) (col. 5, lines 58-64; col. 11, lines 1-5; and examples [Landin et al.]).

Therefore, in addition to the above disclosed limitations, the presently claimed properties of:

- * a mechanical damping coefficient greater than 0.04 and 0.06 at a temperature of 24°C (claims 5, 6, 35 and 36);
- * a moment of inertia of less than 5.5×10^{-3} slug-in², 4.5×10^{-3} slug-in² and 4.0×10^{-3} slug-in² (claims 7 and 51-53;
- * a radial and tangential tilt of less than 1° (claims 8 and 38);
- * a moisture content which varies less than 0.5% at the claimed test conditions (claims 9 and 37);
- * a specific gravity of less than 1.0 (claim 10);
- * a resonant frequency of greater than 250 Hz (claim 11);
- * a first modal frequency greater than an operating frequency (claim 12); and
- * one or less modal frequencies less than an operating frequency (claim 13)

would have necessarily been present because the claimed and prior art products are substantially identical in structure and composition, and there is no evidence currently of record showing that the disclosed prior art products do not necessarily possess the characteristics of the claimed product.

Furthermore, even in the instance that the claimed property limitations would not have necessarily been present in every embodiment taught by [the references of record], it would have been obvious to one having ordinary skill in the art to have minimized the cause effective variables...

(FR, pages 7 and 8)

In other words, the Examiner appears to contend that, all storage media having a substrate with a plastic portion and a data layer that can be at least partly read from, written to, or a

combination thereof by at least one energy field, all have the same properties. However, each prior art reference employed by the Examiner discusses the different properties they obtain by using injection molding instead of hot pressing, or by employing different materials for a substrate, or by using a dampening material, etc. The properties are neither “inherent”, “necessarily present”, nor “cause effective variables”. Merely labeling all of the claim limitations as “necessarily present” or “cause effective variables” does not relieve the Examiner’s burden of establishing a *prima facie* case of obviousness.

A particular parameter must first be recognized as a result-effective variable, i.e., a variable that achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation. *In re Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA 1977)

(MPEP 2144.05 (II.B)) In other words, in order to rely upon this argument, the Examiner must show that each and every one of the above limitations is recognized as a “variable which achieves a recognized result”. Additionally, the Examiner must show that the alleged optimizing of that variable is enabled in the prior art. For example, every car manufacturer and customer desires improved fuel economy. Weight is a known variable that affects the fuel economy of a car. The efficiencies of the fuel and the engine are also factors that affect the fuel economy of a car. Nevertheless, a car with reduced weight, efficient fuel economy, and/or a more efficient engine, and therefore having improved fuel economy (e.g., greater than 50 miles/gallon), is not obvious in view of the desire to have improved fuel economy; actually to the contrary. If it were so obvious, the improved fuel economy cars would be available today. Desires for higher areal densities, commercially viable manufacturing processes, more stable media, and the like, do not render such media obvious.

At a minimum, neither Landin et al., JP ‘921, Wu et al., Chang, nor Lazzari teach, suggest, or mention moment of inertia, tilt (radial or tangential), moisture content, specific gravity, modal frequency, or edge lift. As such, these references cannot be considered to have recognized these properties as “variable[s] which achieve a recognized result”. Neither the recognition nor the enablement of these variables is present in these references. Consequently,

not only are these not recognized “result effective variables” that merely require routine experimentation for optimization, they are not even identified variables.

With respect to inherency,

The fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. *In re Rijckaert*, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993) (reversed rejection because inherency was based on what would result due to optimization of conditions, not what was necessarily present in the prior art); *In re Oelrich*, 666 F.2d 578, 581-82, 212 USPQ 323, 326 (CCPA 1981). “To establish inherency, the extrinsic evidence ‘must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.’” *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999) (citations omitted) (The claims were drawn to a disposable diaper having three fastening elements. The reference disclosed two fastening elements that could perform the same function as the three fastening elements in the claims. The court construed the claims to require three separate elements and held that the reference did not disclose a separate third fastening element, either expressly or inherently.).

“In relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art.” *Ex parte Levy*, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990) (emphasis in original) (Applicant’s invention was directed to a biaxially oriented, flexible dilation catheter balloon (a tube which expands upon inflation) used, for example, in clearing the blood vessels of heart patients). The examiner applied a U.S. patent to Schjeldahl which disclosed injection molding a tubular preform and then injecting air into the preform to expand it against a mold (blow molding). The reference did not directly state that the end product balloon was biaxially oriented. It did disclose that the balloon was “formed from a thin flexible inelastic, high tensile strength, biaxially oriented synthetic plastic material.” *Id.* at 1462 (emphasis in original). The examiner argued that Schjeldahl’s balloon was inherently biaxially oriented. The Board reversed on the basis that the examiner did not provide objective evidence or cogent technical reasoning to support the conclusion of inherency.).

MPEP 2112

It is alleged that “it has been held that where the claimed prior art products are identical or substantially identical in structure or composition, or are produced by identical or substantially identical processes, a prima facie case of obviousness has been established.... In the instant case, the claimed and prior art products are substantially identical in structure and composition(i.e., a composite substrate formed from both rigid materials and plastic materials).... Thus applicant’s claim limitations would have necessarily been present.” (e.g., Paper 13, page 4) The Examiner notes that “if the prior art structure is capable of performing the intended use, then it meets the claim.” (e.g., Paper 13, page 6) Finally, the Examiner appears to argue that the claimed properties of mechanical dampening coefficient, moment of inertia, radial and tangential tilt, moisture content, specific gravity, resonant frequency, first modal frequency, and modal frequencies less than the operating frequency are all inherent features in the product of Landin et al., Kiyotaka et al., Wu et al., Otada et al., and Chang (i.e., “would have necessarily been present”) because the structures are allegedly “substantially identical”. Additionally, where the properties are not present in every embodiment, it allegedly would have been obvious to have minimized these variables.

In order to provide the evidence required by the Examiner to prove that the properties are not inherent in Landin et al., Kiyotaka et al., Wu et al., Chang, and/or Lazzara, Dr. Feist’s Declaration was submitted. Dr. Feist, who is skilled in this art, has reviewed and understands these references. Dr. Feist explains that the present application can be used as a template to modify Landin et al., Kiyotaka et al., Wu et al., and/or Lazzara. However, none of these references teach or suggest the media claimed in the present application. Additionally, the claimed properties do not necessarily flow from the teachings of those references. The disks and properties taught in those references can be made and attained in accordance with those references without attaining the present media. In other words, a media meeting the requirements of Landin et al., Kiyotaka et al., Wu et al., Chang, and/or Lazzara can be prepared that at least does not have a substrate comprising a plastic portion, an edge lift height of less than about $8\text{ }\mu\text{m}$, a surface roughness of less than about $10\text{ }\text{\AA}$, and an axial displacement peak of less than about $500\text{ }\mu\text{m}$ under shock or vibration excitation.

The present claims are non-obvious in view of the references of record.

**b. CLAIMS 28, 29, 54, 55, 71, AND 72 ARE NON-OBVIOUS
OVER LANDIN ET AL. IN VIEW OF WU ET AL.**

As discussed above, Wu et al., teach a high density magnetic recording medium with high HR and low MRT by employing particular layers with particular parameters. Wu et al. do not address tilt or solve the deficiencies of Landin et al. discussed above. Wu et al. are relied upon by the Examiner to teach that

high areal recording density, the ‘linear recording density can be increased by increasing the coercivity of the magnetic recording medium’ (*col. 1, lines 23 – 33*) and further teaches coercivity values meeting applicants’ claimed limitations as desired for high areal recording density recording media (*Figure 4A*).

(Office Action dated June 26, 2003, page 10) However, as is discussed and is evident from the numerous references cited by the Examiner, changes in the various properties of a media (e.g., composition, core/no core, type of core, etc.), can change other properties and characteristics of the media, e.g., damping properties, and the like. It is not obvious, and there is no expectation of success that you can just a change a feature and you will obtain the originally desired disk with that additional desired property. In other words, merely because Wu et al. mention coercivity does not make a particular coercivity of Landin et al. obvious, neither does it provide an avenue to attain that coercivity obvious. There is no motivation or expectation of success to modify Wu et al., as suggested by the Examiner and, even modified, the modified Landin et al. fail to render the present application obvious since Wu et al. fail to cure the deficiencies of Landin et al. discussed above.

**c. CLAIMS 1 – 14, 17, 18, 20, 21, 24 – 26, 30 – 39, 42, 43, 45, 46,
and 49 – 53 ARE NON-OBVIOUS IN VIEW OF KIYOTAKA
ET AL.**

**d. CLAIMS 1 – 14, 17, 18, 20, 21, 24 – 39, 42, 43, 45, 46, and 49 –
55 ARE NON-OBVIOUS IN VIEW OF CHANG**

e. CLAIMS 1 – 27, 30 – 53, 56, AND 58 – 68 ARE NON-OBVIOUS IN VIEW OF OTADA ET AL.

Kiyotaka et al. are directed to a magnetic recording medium having a plastic substrate. Disposed on the substrate are various layers e.g., ceramic layers, buffer layer, non-metallic films, a magnetic layer, a protective lubricating layer. (Abstract)

Chang is directed to a method of making a high density recording medium having a non-magnetic metallic layer on a *flexible substrate*, wherein the high density recording medium can be used as *floppy disk* with greater data storage capacity (Abstract). Appellants contend that a floppy disk clearly would not have an axial peak displacement of less than about 500μ or other features of the present claims such as the claimed damping coefficient, edge lift, moment of inertia, modal frequencies, core (geometry, size, etc.), etc. A floppy disk, by definition, is “floppy”. As is stated in Dr. Feist’s Declaration,

By its very nature, a floppy disk is flexible; i.e., *floppy*. It would not and does not need to meet the limitations of the claims of the Present Application and it is not possible to “optimize” it to meet such limitations without wholly discarding it and replacing it with the media taught in the Present Application.

(Feist Declaration, Paragraph 12) By being floppy, this disk can not meet the various claim limitations.

Otada et al. disclose that to improve surface smoothness so that the deformation is prevented at the time of forming an underlying and magnetic layer and to permit reduction in weight and improvement in productivity by coating the surface of a ceramic substrate with a heat resistant plastic layer (Abstract).

Kiyotaka et al. fail to teach or mention the majority of the claim limitations of Claims 1 – 14, 17, 18, 20, 21, 24 – 26, 30 – 39, 42, 43, 45, 46, and 49 – 53, while Chang fails to teach the majority of the claim limitations of Claims 1 – 14, 17, 18, 20, 21, 24 – 39, 42, 43, 45, 46, and 49 – 55, and Otada et al. fail to teach the majority of the claim limitations of Claims 1 – 27, 30 – 53, 56, and 58 – 68. However, as discussed above, the Examiner has merely labeled all missing limitations as either necessarily present and/or cause effective variables. Considering that many

of the cited references specifically teach problems with the prior art and how the prior art is missing many of the properties they discuss, it is not understood how these variables can be considered “necessarily present” or inherent in any way.

As with the rejection over Landin et al., Sandstrom, Quantegy, Zou et al., Czubarow et al., Stanish et al., Hirata et al., Annacone et al., Yamaguchi, Hartog et al., Tenhover et al., and Bonnebat et al. are referenced as alleged *evidence* that the claimed properties of edge-lift height, axial displacement peak, and surface roughness are mere cause effective variables that may be optimized through mere routine experimentation, while areal density is allegedly not worthy of patentable weight. As discussed in detail above, these references do not render the claim limitations cause effective variables, and are actually support to the contrary. Mori et al. (is not a valid prior art reference since it was filed after the filing of the present application), Miyake et al., Kuromiya et al., and Oniki et al., are further employed as “evidence”. Mori et al, allegedly provide evidence regarding specific gravity and mechanical damping coefficient, while Miyake et al., Kuromiya et al., and Oniki et al. allegedly provide evidence regarding the number of modal frequencies less than an operating frequency, resonant frequency, and first modal frequency.

It appears that, provided the hindsight afforded by the present application, this application has been used as a template to pick and choose various teachings of the prior art as “evidence” that the prior art can allegedly be modified or improved by changing the properties to meet the claimed limitations. However, obviousness is determined at the time of the present invention. For an obviousness rejection to be proper, the Examiner must meet the burden of establishing a prima facie case of obviousness. *In re Fine*, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988). Establishing a prima facie case of obviousness requires that all elements of the invention be disclosed in the prior art. *In Re Wilson*, 165 U.S.P.Q. 494, 496 (C.C.P.A. 1970). Further, even assuming that all elements of an invention are disclosed in the prior art, an Examiner can not establish obviousness by locating references that describe various aspects of a patent Appellant’s invention without also providing evidence of the motivating force which would have impelled one skilled in the art to do what the patent Appellant has done. *Ex parte Levengood*, 28

U.S.P.Q.2d 1300 (Bd. Pat. App. Int. 1993). The references, when viewed by themselves and not in retrospect, must suggest the invention. *In Re Skoll*, 187 U.S.P.Q. 481 (C.C.P.A. 1975).

Merely stating that there is a general desire to improve storage media, to have “flat” media, etc., is not sufficient to provide motivation to combine or modify various references or that a reference can be modified without undue experimentation. The test is not what one of ordinary skill in the art *could* do, but what one of ordinary skill in the art *would* do in view of the entire teachings of the references. It is further not the test what one of ordinary skill in the art *could* do today, but what one of ordinary skill in the art *would* have done, at the time of the present invention, in view of the entire teachings of the references.

None of the cited references teach all of the limitations of the present invention, alone or as “evidenced” by various other references. As can be seen from the various references, many different avenues have been taken in an attempt to improve storage media technology. Each of these teachings has advantages and disadvantages, and not all of the teachings are combinable. For example, in order to rely on the composition of one reference to obtain a particular property, the composition of another reference can’t be employed. The present application is non-obvious in view of the art of record.

- f. CLAIMS 15, 16, 19, 22, 23, 27, 40, 41, 44, 47, 48, and 56 – 70 ARE NON-OBVIOUS OVER KIYOTAKA ET AL., AND FURTHER IN VIEW OF LANDIN ET AL.**
- g. CLAIMS 15, 16, 19, 22, 23, 40, 41, 44, 47, 48, AND 56 – 72 ARE NON- OBVIOUS OVER CHANG IN VIEW OF LANDIN ET AL.**
- h. CLAIMS 69 AND 70 ARE NON-OBVIOUS OVER OTADA ET AL. IN VIEW OF LANDIN ET AL**

Considering that Kiyotaka et al., Chang, and Otada et al., all have the same deficiencies as Landin et al., and considering that Kiyotaka et al., Chang, and Otada et al., rely on the same “evidence” as Landin et al to allegedly cure those deficiencies, Kiyotaka et al., Chang, and Otada

et al., in view of Landin et al., still fail to render the present claims obvious. Even in combination these references have the same deficiencies. They fail to teach or suggest many of the properties of the present claims. These properties are neither inherent nor cause effective variables.

i. CLAIMS 28, 29, 54, 55, 71, AND 72 ARE NON-OBVIOUS OVER KIYOTAKA ET AL. OR OTADA ET AL. (abstract only), AND FURTHER IN VIEW OF WU ET AL.

As discussed in detail above, Kiyotaka et al. and Otada et al. have the same deficiencies as Landin et al.

Wu et al., failed to cure the deficiencies of Landin et al., and similarly fail to cure the deficiencies of Kiyotaka et al. and Otada et al. Hence, for at least the reasons discussed above in relation to Landin et al., Kiyotaka et al., Otada et al., and Wu et al., the combination of Kiyotaka et al. or Otada et al., and Wu et al., fails to render the present claims obvious.

j. CLAIMS 73 AND 74 ARE OBVIOUS OVER CHANG OR OTADA ET AL. IN VIEW OF LAZZARI

k. CLAIM 75 IS NON-OBVIOUS OVER CHANG IN VIEW OF LANDIN ET AL., AND FURTHER IN VIEW OF LAZZARI

As discussed in detail above, Chang, Otada et al., and Landin et al., all have the same deficiencies, they fail to teach or render obvious many of the claimed limitations of the present application. Lazzari is directed a substrate for magnetic disk memory comprising an aluminum wafer with two plastic sheets pressed thereto. As with Chang, Otada et al., and Landin et al., Lazzari fails to teach or render obvious many of the claimed limitations of the present application, such as axial displacement, edge-lift height, surface roughness, etc. Hence, even in combination, these references fail to render the present application obvious.

I. PATENTABLE LIMITATIONS

As noted by the Examiner, processing limitations in the article claims is not patentable unless there is a structural difference in the final product. As is evidenced by art of record, using different formation techniques (e.g., hot pressing or injection molding; various polishing techniques, etc.), result in media having different properties; they are structurally different. Appellants contend that the alleged process limitations are patentable.

Appellants further contend that areal density is not a use limitation but is a property of the media. For example, as can be clearly seen by reading the front of a floppy disc, CD, or DVD, the medium's capacity is a property of the media, and is therefore patentable.

2. THE EXAMINER'S RESPONSE TO APPELLANTS' POSITION

The above basic position has been set forth in numerous responses to office actions. Essentially, it is Appellants' position that the Examiner's entire position is based upon assumptions loosely based upon hindsight provided by the present application, in combination with speculation. Essentially, any claim by Appellants that was not taught by the prior art was labeled as "necessarily present" and/or a "cause effective variable". The Examiner contends that:

Clearly, uniformly produced, flat surfaces are required for any data storage disks to function optimally (imaging a magnetic head trying to read a disk with vastly changing elevations while rotating at an extreme rate of speed.)

For example, "edge-lift height", axial displacement peak, radial tilt and tangential tilt are all essentially measurements of how "flat" a disk surface is... The Examiner deems that one of ordinary skill in the art would be well aware that producing flat, uniform disks would be desirable for allowing the read/write head to be positioned as close as possible to the data surface. Therefore the only "optimization" required is to reduce the defects and non-uniformity of the disk to be as small as possible (i.e. 0), which reads on the claimed property ranges since all the above are desired to be "less than" certain numerical value.... No evidence has been provided that any specific combination of materials or properties must be utilized to obtain the claimed "minimal" values or that the substrates disclosed by the prior art references would be physically incapable of obtaining them.... The fact that prior art disks *can* be made with edge lift heights, axial displacement

peaks, radial tilts and tangential tilts (or any property) greater than 0 is merely a trade-off between cost-effective disks versus the flattest, smoothest, most uniform disks obtainable based upon the knowledge in the field. Again, there is no evidence of record that applicants have discovered some combination of properties that is unobtainable or non-obvious over the prior art references, especially given that the prior art knowledge to optimize the various properties as cited in the rejections of record.

(FR, Pages 30 – 31; *emphasis* in original)

Appellants have not claimed that, with the knowledge and teachings of the present application as well as the techniques, equipments, and methods available today, that an artisan can not, with hindsight, obtain the claimed ‘minimal’ values with the prior art. However, the test is not what one of ordinary skill in the art *could* do, but what one of ordinary skill in the art *would* do at the time of the present application. It is clear just from the references of record that changes in substrate composition, methods of formation (e.g., hot press versus injection molding) and other factors affect the properties of the final product. Many entities are attempting to improve the technology of storage media, e.g., to increase storage density and to decrease size. Changes to one aspect of the media, however, can adversely affect another aspect of the media. One can not merely take all of the elements taught in the prior art like a list and add them together to get the “perfect” media. Different media have different requirements, e.g., birefringence, rigidity, roughness, etc. One must view the references as would one of ordinary skill in the art and determine if there is motivation and an expectation of success to modify a reference and/or combine references. A mere teaching that better media is desired is does not render all properties of a media obvious, “cause effective variables”, and/or necessarily present.

Regarding the Chang reference, the Examiner contends:

Dr. Feist... argues that, regarding the Change reference, “it is not obvious or even logical to think that a floppy disk has an edge lift height of less than 8μ , a surface roughness of less than about 10\AA , and an axial displacement peak of less than about 500μ under shock or vibration excitation” (*Paragraph 12*), but has provided no experimental evidence illustrating that the Chang reference either does not necessarily possess these properties or *cannot* possess these properties. The

Examiner does not find the declaration convincing since the properties such as “edge lift height” and surface roughness are simply a matter of insuring uniform polishing and deposition and are deemed to easily be obtainable if not necessarily present.

While the Examiner acknowledges the language “floppy” implies certain characteristics of the disks formed, the Examiner again notes that the properties that applicants’ are claiming may or may not be necessarily present in the substrates formed according to the Chang reference, especially the example using a *metal* core. The examiner notes that metals can be made to have extremely flat, uniform surfaces and applicants have provided no measurements of the Chang example to illustrate that it either does not necessarily possess the claimed properties, is incapable of obtaining the claimed properties, or both.

(FR, pages 31 – 32; *emphasis* in original)

Appellants note that they, via prior responses and Dr. Feist’s Declaration, clarified that a floppy disk can not have the properties of Claim 1 as well as other claims, due to its very nature (i.e., its inherent properties), as is well understood in the art. Appellants further contend that one of ordinary skill in the art would understand that floppy disks do not have such properties, as is supported by Dr. Feist’s Declaration. Experimental data is not needed to understand this fact.

It is noted that a misunderstanding of the inventiveness of the present application and the differences and advances in the technology describe by the Appellants in the application and in the prior response is evidenced by the continued reliance upon Chang. Chang is directed to a method of making a high density recording medium having a non-magnetic metallic layer on a *flexible substrate*, wherein the high density recording medium can be used as *floppy disk* with greater data storage capacity (Abstract). (It is noted that “floppy disks” have a maximum storage capacity of less than 1.5 MB) Not only does Chang not meet any of the properties that are alleged to be “necessarily present” and/or cause effective variables, Chang cannot even be modified to meet the claimed limitations, without wholly disregarding the teachings of Chang, especially the most basic teaching (i.e., that the disk is floppy). A floppy disk having a flexible substrate does not and cannot meet the claimed limitations and still be a floppy disk having a flexible substrate.

IX. CONCLUSION:

In summary, all of the claims of the present application are non-obvious in view of the art of record, alone or in combination, and in view of the “evidence” provided by the Examiner. The various claimed properties are neither “necessarily present” nor “cause effective variables”. The prior art of record itself provides evidence: (i) that there is a continued need in the art to improve storage media, and (ii) that the properties are not inherent (e.g., media having similar layers (e.g., substrate and layers)) can have very different properties due to how the media was formed, processed, its composition, etc.

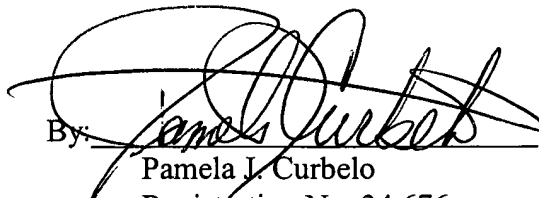
The rejections based upon inherency (e.g., that the property is “necessarily present”) are unfounded and incorrect since the media described by the cited references can be produced without the allegedly inherent property as is supported by the attached Declaration of Dr. Feist. Inherency may not be established by probabilities or possibilities. Additionally, the claimed limitations are not cause effective variables.

Considering that the claimed media are non-obvious, and that the properties are not “necessarily present” or “cause effective variables”, the Examiner has failed to establish a *prima facie* case of obviousness. In view of the foregoing, it is urged that the Final Rejection of Claims 1 – 75 be overturned and the claims allowed. The final rejection is in error and should be reversed.

If there are any additional charges with respect to this Appeal Brief, please charge them to Deposit Account No. 07-0862.

Respectfully submitted,

CANTOR COLBURN, LLP

By: 
Pamela J. Curbelo
Registration No. 34,676
Customer No. 23413

Date: March 15, 2004

APPENDIX A
CLAIMS

1. (Original) A data storage media, comprising:
a substrate comprising at least one plastic portion, an edge lift height of less than about 8 μ , a surface roughness of less than about 10Å, and an axial displacement peak of less than about 500 μ under shock or vibration excitation; and
at least one data layer on said substrate;
wherein said data layer can be at least partly read from, written to, or a combination thereof by at least one energy field; and
wherein, when the energy field contacts said data storage media said energy field is incident upon said data layer before it could be incident upon said substrate.
2. (Original) The data storage media as in Claim 1, wherein said substrate further comprises an edge-lift height is less than about 5 μ .
3. (Original) The data storage media as in Claim 2, wherein said edge-lift height is less than about 3 μ .
4. (Original) The data storage media as in Claim 1, wherein said surface roughness is less than about 5 Å.
5. (Original) The data storage media as in Claim 1, wherein said substrate further comprises a mechanical damping coefficient of greater than about 0.04 at a temperature of 24°C.
6. (Original) The data storage media as in Claim 5, wherein said mechanical damping coefficient is greater than about 0.06 at a temperature of 24°C.

7. (Original) The data storage media as in Claim 1, wherein said substrate further comprises a moment of inertia of less than about 5.5×10^{-3} slug-in².
8. (Original) The data storage media as in Claim 1, wherein said substrate further comprises a radial tilt and tangential tilt independently of less than about 1° each.
9. (Original) The data storage media as in Claim 1, wherein a moisture content of said substrate varies less than about 0.5% at equilibrium under test conditions of 80°C at 85% relative humidity after 4 weeks.
10. (Original) The data storage media as in Claim 1, wherein said substrate further comprises a specific gravity of less than about 1.0.
11. (Original) The data storage media as in Claim 1, wherein said substrate further comprises a resonant frequency of greater than about 250 Hz.
12. (Original) The data storage media as in Claim 1, wherein said substrate further comprises a first modal frequency greater than an operating frequency.
13. (Original) The data storage media as in Claim 1, wherein said substrate further comprises one or less modal frequencies less than an operating frequency.
14. (Original) The data storage media as in Claim 1, wherein said substrate further comprises a core having a substantially constant thickness.
15. (Original) The data storage media as in Claim 1, wherein said substrate further comprises a core having a varied thickness.

16. (Original) The data storage media as in Claim 1, wherein said substrate further comprises a core having a cross-sectional geometry selected from the group consisting of concave, convex, tapered, and combinations comprising at least one of the foregoing core geometries.

17. (Original) The data storage media as in Claim 1, wherein said substrate further comprises a core having a core outer diameter substantially equal to a substrate outer diameter.

18. (Original) The data storage media as in Claim 1, wherein said substrate further comprises a core having a geometry selected from the group consisting of at least one radial arm, at least one ring, star-like, and combinations comprising at least one of the foregoing geometries.

19. (Original) The data storage media as in Claim 1, wherein said substrate further comprises a core comprising at least one hollow cavity.

20. (Original) The data storage media as in Claim 1, wherein said substrate further comprises a core comprising at least one filled cavity.

21. (Previously Presented) The data storage media as in Claim 20, wherein said filled cavity comprises a material selected from the group consisting of glass, foams, carbon, metals, ceramics, thermoplastics, thermosets, rubbers, among others and composites, alloys and combinations comprising at least one of the foregoing materials.

22. (Original) The data storage media as in Claim 1, wherein said substrate further comprises a core comprising multiple portions.

23. (Original) The data storage media as in Claim 22, wherein said multiple portions comprise different materials.

24. (Original) The data storage media as in Claim 1, wherein said substrate further comprises preformed core.

25. (Original) The data storage media as in Claim 1, wherein said substrate further comprises a core formed in situ with said substrate.

26. (Previously Presented) The data storage media as in Claim 1, wherein said substrate consists essentially of plastic.

27. (Original) The data storage media as in Claim 26 wherein said plastic comprises a resin selected from the group consisting of polyvinyl chloride, polyolefins, polyesters, polyimide, polyamides, polysulfones, polyether imides, polyether sulfones, polyphenylene sulfides, polyether ketones, polyether ether ketones, ABS resins, polystyrenes, polybutadiene, polyacrylates, polyacrylonitrile, polyacetals, polycarbonates, polyphenylene ethers, ethylene-vinyl acetate copolymers, polyvinyl acetate, liquid crystal polymers, ethylene-tetrafluoroethylene copolymer, aromatic polyesters, polyvinyl fluoride, polyvinylidene fluoride, polyvinylidene chloride, tetrafluoroethylene fluorocarbon polymers, and blends, copolymers, mixtures, reaction products, and composites comprising at least one of the foregoing resins.

28. (Original) The data storage media as in Claim 1, wherein said data layer has a coercivity of greater than about 1,500 oersted.

29. (Original) The data storage media as in Claim 28, wherein said coercivity is greater than about 3,000 oersted.

30. (Previously Presented) A data storage media, comprising:
a substrate comprising at least one plastic portion and an axial displacement peak of less than about 500 μ under shock or vibration excitation, an areal density of about 10 Gbit/in², and a surface roughness of less than about 10Å; and
at least one data layer on said substrate;
wherein said data layer can be at least partly read from, written to, or a combination thereof by at least one energy field; and
wherein, when the energy field contacts said storage media said energy field is incident upon said data layer before it could be incident upon said substrate.

31. (Original) The data storage media as in Claim 30, wherein said axial displacement peak is less than about 150 μ .

32. (Original) The data storage media as in Claim 30, wherein said edge-lift height is less than about 5 μ .

33. (Previously Presented) The data storage media as in Claim 32, wherein said edge-lift height is less than about 3 μ .

34. (Original) The data storage media as in Claim 30, wherein said surface roughness is less than about 5Å.

35. (Original) The data storage media as in Claim 30, wherein said substrate further comprises a mechanical damping coefficient of greater than about 0.04 at a temperature of 24°C.

36. (Previously Presented) The data storage media as in Claim 35, wherein said mechanical damping coefficient is greater than about 0.06 at a temperature of 24°C.

37. (Original) The data storage media as in Claim 30, wherein a moisture content of said substrate varies less than about 0.5% at equilibrium under test conditions of 80°C at 85% relative humidity after 4 weeks.

38. (Original) The data storage media as in Claim 30, wherein said substrate further comprises a radial tilt of less than about 1°.

39. (Original) The data storage media as in Claim 30, wherein said substrate further comprises a core having a substantially constant thickness.

40. (Original) The data storage media as in Claim 30, wherein said substrate further comprises a core having a varied thickness.

41. (Original) The data storage media as in Claim 30, wherein said substrate further comprises a core having a cross-sectional geometry selected from the group consisting of concave, convex, tapered, and combinations comprising at least one of the foregoing core geometries.

42. (Original) The data storage media as in Claim 30, wherein said substrate further comprises a core having a core outer diameter substantially equal to a substrate outer diameter.

43. (Original) The data storage media as in Claim 30, wherein said substrate further comprises a core having a geometry selected from the group consisting of at least one radial arm, at least one ring, star-like, and combinations comprising at least one of the foregoing geometries.

44. (Original) The data storage media as in Claim 30, wherein said substrate further comprises a core comprising at least one hollow cavity.

45. (Original) The data storage media as in Claim 30, wherein said substrate further comprises a core comprising at least one filled cavity.

46. (Original) The data storage media as in Claim 45, wherein said filled cavity comprises a material selected from the group consisting of glass, foams, carbon, metals, ceramics, thermoplastics, thermosets, rubbers, among others and composites, alloys and combinations comprising at least one of the foregoing materials.

47. (Original) The data storage media as in Claim 30, wherein said substrate further comprises a core comprising multiple portions.

48. (Original) The data storage media as in Claim 47, wherein said multiple portions comprise different materials.

49. (Original) The data storage media as in Claim 30, wherein said substrate further comprises preformed core.

50. (Original) The data storage media as in Claim 30, wherein said substrate further comprises a core formed in situ with said substrate.

51. (Original) The data storage media as in Claim 30, wherein substrate further comprises a moment of inertia of less than about 5.5×10^{-3} slug-in².

52. (Original) The data storage media as in Claim 51, wherein said moment of inertia is less than about 4.5×10^{-3} slug-in².

53. (Original) The data storage media as in Claim 52, wherein said moment of inertia is less than about 4.0×10^{-3} slug-in².

54. (Original) The data storage media as in Claim 30, wherein said data layer has a coercivity of greater than about 1,500 oersted.

55. (Original) The data storage media as in Claim 54, wherein said coercivity is greater than about 3,000 oersted.

56. (Original) A data storage media, comprising:
a substrate comprising at least one plastic resin portion and a core, wherein said core further comprises a varied thickness; and
at least one data layer disposed on said substrate.

57. (Original) The data storage media as in Claim 56, wherein said core comprises a cross-sectional geometry selected from the group consisting of concave, convex, tapered, and combinations comprising at least one of the foregoing core geometries.

58. (Original) The data storage media as in Claim 56, wherein said core comprises a core outer diameter substantially equal to a substrate outer diameter.

59. (Original) The data storage media as in Claim 56, wherein said core comprises a geometry selected from the group consisting of at least one radial arm, at least one ring, star-like, and combinations comprising at least one of the foregoing geometries.

60. (Original) The data storage media as in Claim 56, wherein said core comprises at least one hollow cavity.

61. (Original) The data storage media as in Claim 56, wherein said substrate further comprises a core comprising at least one filled cavity.

62. (Original) The data storage media as in Claim 61, wherein said filled cavity comprises a material selected from the group consisting of glass, foams, carbon, metals, ceramics, thermoplastics, thermosets, rubbers, among others and composites, alloys and combinations comprising at least one of the foregoing materials.

63. (Original) The data storage media as in Claim 56, wherein said core comprises multiple portions.

64. (Original) The data storage media as in Claim 63, wherein said multiple portions comprise different materials.

65. (Original) The data storage media as in Claim 56, wherein said core is preformed.

66. (Original) The data storage media as in Claim 56, wherein said core is formed in situ with said substrate.

67. (Previously Presented) The data storage media as in Claim 56, wherein said substrate consists essentially of plastic.

68. (Original) The data storage media as in Claim 67, wherein said plastic comprises a resin selected from the group consisting of polyvinyl chloride, polyolefins, polyesters, polyimide, polyamides, polysulfones, polyether imides, polyether sulfones, polyphenylene sulfides, polyether ketones, polyether ether ketones, ABS resins, polystyrenes, polybutadiene, polyacrylates, polyacrylonitrile, polyacetals, polycarbonates, polyphenylene ethers, ethylene-vinyl acetate copolymers, polyvinyl acetate, liquid crystal polymers, ethylene-tetrafluoroethylene copolymer, aromatic polyesters, polyvinyl fluoride, polyvinylidene fluoride, polyvinylidene chloride, tetrafluoroethylene fluorocarbon polymer, and blends, copolymers, mixtures, reaction products, and composites comprising at least one of the foregoing resins.

69. (Original) The data storage media as in Claim 67, wherein said substrate further comprises reinforcement selected from the group consisting of fibers, whiskers, fibrils, nanotubes, particulate, and combinations comprising at least one of the foregoing reinforcements.

70. (Original) The data storage media as in Claim 69, wherein said reinforcement is selected from the group consisting of metal, mineral, ceramic, glass, and combinations comprising at least one of the foregoing reinforcements.

71. (Original) The data storage media as in Claim 56, wherein said data layer has a coercivity of greater than about 1,500 oersted.

72. (Original) The data storage media as in Claim 71, wherein said coercivity is greater than about 3,000 oersted.

73. (Previously Presented) The data storage media as in Claim 1, wherein said plastic portion comprises pits and grooves.

74. (Previously Presented) The data storage media as in Claim 30, wherein said plastic portion comprises pits and grooves.

75. (Previously Presented) The data storage media as in Claim 56, wherein said plastic portion comprises pits and grooves.

APPENDIX B
DECLARATION OF DR. THOMAS FEIST

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	THOMAS P. FEIST ET AL.)
) Group Art Unit: 1773
Serial No.:	09/845,743)
)
Filed:	May 01, 2001)
) Examiner: K. Bernatz
For:	DATA STORAGE MEDIA)

DECLARATION PURSUANT TO 37 C.F.R. § 1.132

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

I, Thomas P. Feist, declare and state:

1. My educational background includes a B.S. in Chemistry from Williams College (1985), and a Ph.D. in Materials Science and Engineering from University of Pennsylvania (1991).
2. I have been employed by the General Electric Company since 1996, where I am currently manager of the Thin Films Laboratory at GE Global Research.
3. I have worked in the field of data storage media since 1997.
4. I have read and understand U.S. Patent Application Serial No. 09/845,743 (hereinafter the "Patent Application").
5. I have read and understand U.S. Patent No. 5,538,774 to Landin et al., JP-02-096921 A (JP '921; abstract only), U.S. Patent No. 6,156,422 to Wu et al., U.S. Patent No. 6,433,964 to Chang, and U.S. Patent No. 4,911,967 to Lazzari.

6. I have read and understand the Final Rejection for the Patent Application, Paper 13, (hereinafter “Final Rejection”).

7. From reading the Final Rejection, as well as being aware of the related cases and the rejections therein, it appears that there is confusion regarding the state of the art in the area of storage media as well as the progression of the storage media technology. It is my understanding that inventiveness is determined at the time of the invention and not in hindsight. At the time of the present invention, an artisan would not have known about or been able to produce storage media as claimed in the present application based upon the teachings of Landin et al., JP ‘921, Wu et al., Chang, and/or Lazzari.

8. The following is a summary of the history of storage media. It should be understood that this area of technology is crowded, very active, and very inventive. As is well known, in the early 1980s, most people worked on terminals connected to very large mainframe computers that stored all of the data. These mainframe computers (“main frames”) were the size of small rooms. By the end of the 1980s, many people, particularly college students and businesses, owned and worked on personal computers where data was stored locally, in computers the size of boxes that readily fit beneath a desk, and/or on floppy disks (i.e., a media that required a solid plastic housing due to its highly flexible nature). These floppy disks were capable of storing a maximum of less than 1 megabyte (MB) of data. The next advance in the technology was the advent of the smaller floppy disk that stored more data (i.e., 1.44 MB of data). Although there is

always a desire to store more data in a smaller space, the design and properties of the smaller floppy disk was not obvious in view of the original floppy disk.

More storage and speed was needed from the floppy disks, but was not attainable so the industry turned to hard disks. These disks stored more data but were very large (e.g., up to half a meter in diameter) and not readily available to the general public.

Around the early 1990s the hard disks became more available to the general public as the price and size decreased. Throughout the 1990s, industry continued to drive toward smaller, faster, cheaper, higher capacity hard disks. Hard disk drives became common in home computers as well as in personal computers used in businesses. Eventually the limiting factor for these hard disks, however, became the physical capability of putting additional data thereon. New recording head and magnetic thin film technology has resulted in continual increases in data density, but the rate of increase has slowed. That is, the newer disks were reaching technological limits of data density (bits per square inch), and in fact are approaching the “super-parametric limit” where additional data could not be disposed onto the disk without the potential for spontaneous loss of data due to demagnetization. The technology had to take another turn or it would not advance.

9. The present Patent Application teaches and claims the next advance in the technology where the substrate for the storage media comprises at least one plastic portion, an edge lift height of less than about $8\ \mu$, a surface roughness of less than about 10\AA , and an axial displacement peak of less than about $500\ \mu$ under shock or vibration excitation. The present application additionally teaches the effects and desired modal frequencies, tilt, surface features, moment of inertia, and other factors that enable

additional data storage that was not previously available for storage media as claimed in the present application.

10. Applicants have discovered a way to increase the capacity of data storage media beyond that previously available. Applicants note that their application claims the benefit of filing dates in 1999. The technology has further advanced since 1999, e.g., individuals can purchase hard disks with up to about 200 Gigabytes (GB) of data storage for a few hundred dollars whereas in 1999 such media was not even available. These technological advances illustrated by the marketplace, however, do not render the present invention obvious. Actually, they support the position that advances were non-obvious and greatly desired. There has been great commercial success in this area, and the market for higher capacity media is growing exponentially.

11. The limitations taught and claimed in the Present Application were not obvious to artisans at the time of the Present Application. Granted, a desire to improve capacity existed, and continues to exist. Avenues and processes that enable such improvement did not exist. In fact, there were several articles written about the need to find a new way to achieve higher density media and “beat” the superparamagnetic limit. Researchers have postulated various means of achieving this, such as Heat Assisted Magnetic Recording, but none have been able to demonstrate a way to achieve it. In other words, an unfulfilled need existed in the industry that is met by the present invention. A mere desire to have an improved product does not render the improvement obvious. If all of these improvements were so obvious, the market for this technology would not be dominated by a handful of high technology companies; it would be flooded

by individuals looking to jump on the bandwagon. This field is not an area where all technological advances have already been made. It is an area where highly skilled and educated people are racing to reduce costs, decrease media size, and increase data retrieval speeds in order to give their company a competitive advantage in the marketplace.

12. With respect to the particular references cited in the Final Rejection, these references do not render the claimed invention obvious. For example, Chang is directed to floppy disks. It is not obvious or even logical to think that a floppy disk has an edge lift height of less than about $8\text{ }\mu$, a surface roughness of less than about 10\AA , and an axial displacement peak of less than about $500\text{ }\mu$ under shock or vibration excitation, for example. By its very nature, a floppy disk is flexible; i.e., *floppy*. It would not and does not need to meet the limitations of the claims of the Present Application and it is not possible to “optimize” it to meet such limitations without wholly discarding it and replacing it with the media taught in the present application.

13. With respect to Landin et al., JP ‘921 (abstract only), Lazzari, and Wu et al., the Examiner seems to recognize that the claimed limitations in the Present Application are not inherent, i.e., are not necessarily present: “in the instance that the claimed property limitations would not necessarily have been present... it would have been obvious to one having ordinary skill in the art to have minimized the cause effective variables...”. It is correct that the claimed elements of the Present Application are not necessarily present in these references. The limitations set forth in the references can readily be attained without meeting the limitations of the claims of the Present

Application. In other words, thru testing, experiments, and/or modeling performed during the development of the claimed media, disks having the parameters described in these references were reviewed for their properties. These disks failed to meet the claimed limitations.

14. In hindsight (i.e., with the teaching and knowledge imparted by the Present Application), Landin et al., JP '921 (abstract only), Lazzari, and Wu et al. can be altered to meet the teachings of the Present Application. However, there is no teaching or motivation in these references to any such modification and the claimed limitations do not necessarily flow from the references' teachings. There is no enablement in these applications on how to meet the claim limitations or mention of their existence or importance. At a minimum, none of these references even mention: edge lift, moment of inertia, tilt (radial or tangential), moisture content, specific gravity, or modal frequency. These are variables identified and claimed in the Present Application. They are non-obvious and not mere optimizations.

15. Many characteristics, and in particular the combination of characteristics, set forth in the Patent Application are not identified or addressed in any of Landin et al., JP '921 (abstract only), Lazzari, and Wu et al.. Recitation of multiple references that all fail to teach the claimed ranges and even to identify the claimed properties is evidence of the non-obviousness of the present claims' and the advance that applicants have provided to the field of storage media. The Patent Application identifies a unique product that meets certain characteristics, thereby allowing it to attain high capacity while being mass producible.

16. I further declare that all statements and representations made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements and representations were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued therefrom.

Sept. 26, 2003

Dated

Th P. Feist

Thomas P. Feist